

# 1 elementary logic

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## 1.1 INTRODUCTION

Logic is the theory of systematic reasoning.\* Symbolic logic then is the formal theory of logic. The logic which we will consider here is rather elementary and is the logic which is commonly used in mathematics and other sciences.

The study of logic is important in its own right, since systematic reasoning is the basis of all one does in mathematics. However, here we are interested in logic mainly as it will be used later in the study of mathematics. First, the symbols and laws we develop in this chapter will be used to simplify and clarify later work. Also, the axiomatic approach used in the study of logic here illustrates the nature of a formal mathematical theory. The student should become aware of the wide applicability of the concepts and notation of symbolic logic as well as the logical laws which will be proved.

## 1.2 AN INTUITIVE INTRODUCTION

The purpose of this section is to introduce in an intuitive manner the logical formulas which will be used later in the axiomatic development. Truth tables are used to illustrate the meaning of the several connectives. Since we are striving for applicability of symbolic logic, it is important that the student understand the meaning of the connectives well enough to translate verbal statements into logical formulas and logical formulas into acceptable verbal statements.

A *proposition* is a declarative sentence which is either true or false, *but not both*. For example, "Mary went to town" is a proposition; but

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\* Kenneth O. May, *Elements of Modern Mathematics* (Addison-Wesley, 1959).